CLAIMS

What is Claimed is:

1. A system for conditioning intake air for an internal combustion engine, the system comprising:

an oxygen separation system operative to separate oxygen from air and to discharge separate exhaust streams, wherein a first one of the exhaust streams is enriched in oxygen;

a first suction source connected to the oxygen separation system, configured to suction the first one of the exhaust streams from the oxygen separation system;

an internal combustion engine receiving the first one of the exhaust streams for use in combustion; and

a second suction source connected to the oxygen separation system, configured to suction a second one of the exhaust streams from the oxygen separation system.

2. The system of Claim 1, wherein the oxygen separation system further comprises a substantially sealed passageway connecting a first exhaust port for the first exhaust stream with a second exhaust port for the second exhaust stream, and an entry port into the passageway between the first exhaust port and the second exhaust port.

3. The system of Claim 2, wherein the oxygen separation system further comprises a first gas-permeable electrode disposed across the passageway, and a second gas permeable electrode disposed across the passageway.

4. The system of Claim 3, wherein the oxygen separation system further comprises a chamber bounded by the first and second gas-permeable electrodes, the entry port opening into the chamber.

5. The system of Claim 4, wherein the entry port comprises a plurality of small openings leading into the chamber.

6. The system of Claim 3, further comprising a high-voltage source connected to the first and second gas-permeable electrodes, whereby a static electric field is maintained between the first and second electrodes.

7. The system of Claim 5, wherein the high-voltage source comprises an ignition coil for the internal combustion engine.

8. The system of Claim 1, wherein the oxygen separation system further comprises a substantially sealed passageway connecting a first exhaust port for the first exhaust stream with a second exhaust port for the second exhaust stream, and at least three gas-permeable electrodes disposed across the passageway between the first and second exhaust ports.

9. The system of Claim 8, further comprising a voltage divider connected to the at least three electrodes, the voltage divider dividing a voltage output from a high-voltage source among the at least three electrodes.

10. The system of Claim 1, wherein the first suction source comprises an air intake manifold of the internal combustion engine.

11. The system of Claim 1, wherein the oxygen separation system further comprises an entry port sized to result in a maximum oxygen output from the oxygen separation system when the internal combustion engine is operating at its peak power speed.

12. The system of Claim 1, wherein the first suction source comprises an air pump.

13. The system of Claim 1, wherein the first suction source comprises a mechanical pump.

14. The system of Claim 1, further comprising a line configured to discharge the second one of the exhaust streams into an exhaust system for the internal combustion engine.

15. The system of Claim 1, wherein the second suction source comprises a vacuum created using an exhaust stream of the internal combustion engine.

16. The system of Claim 1, wherein the second suction source comprises an air pump.

17. The system of Claim 1, further comprising an air metering system connected to the oxygen separation system, the air metering system comprising two inlets, a mixing section, and an outlet, wherein a first one of the two inlets is connected to receive the first one of the exhaust streams, and a second one of the two inlets is configured to receive ambient air.

18. The system of Claim 17, wherein the outlet of the air metering system is connected to an air intake port for the internal combustion engine.

19. The system of Claim 18, wherein the air metering system further comprises a flow control valve configured to control the flow through at least one of the two inlets.

20. The system of Claim 1, further comprising an adjustable valve connected in series with an entry port of the oxygen separation system.

21. The system of Claim 1, further comprising an air filter connected in series with an entry port of the oxygen separation system.

22. The system of Claim 21, further comprising a plenum downstream of the filter, and a plurality of small openings leading from the plenum into the oxygen separation system.

23. The system of Claim 1, further comprising an electronic control system configured to control total oxygen flow into the internal combustion engine.

24. The system of Claim 23, further comprising an oxygen sensor disposed in the first one of the exhaust streams and connected to provide data to the electronic control system.

25. The system of Claim 1, wherein the internal combustion engine comprises a diesel engine.

26. The system of Claim 1, wherein the internal combustion engine comprises a gasoline engine.